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POPULAR MECHANICS

An Illustrated Weekly Review of the Mechanical Press of the World

"Tells you how to do things" Written so you can understand it

Vol. 2. No. 13 CHICAGO, SEPTEMBER 27, 1902. PRICE 5 CENTS.

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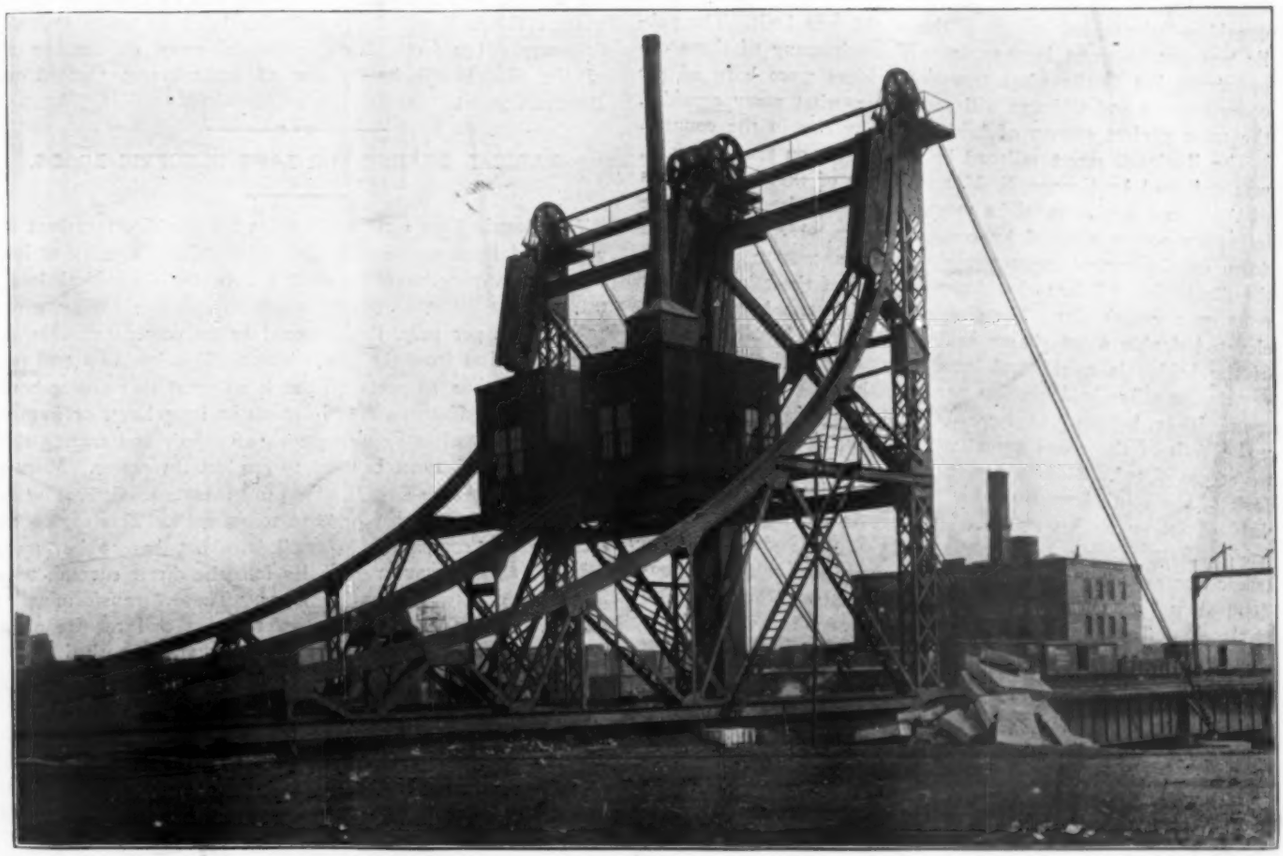
Oddest of Chicago's Odd Bridges



Queer Modern Structure Built on the Principle of the Ancient English Drawbridge

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Modern Bridge from Ancient Design.
Tunnels Under Cities Great Dangers in Time of War.
Locomotives of a Century (continued).
Great Demand for Young Men in Engineering Work.
French Electrical Instrument to Revive Drowned Persons.
Finest Brown Paint Made from Mummies.
How to Make a Mariner's Compass.
Shop Notes:—Device for Washing Overalls—Stripping Silver from Plated Articles—New Rotary Synchronizer—How to Make a Sparking Coil—Another Solder for Aluminum—Swaying of Belts, and Cure—Nitric Acid Made from Air—Dinner Pail Heater—Solid Foot for Ladders.
Bears Predict a Cold Winter.
Radical Change for Long Electric Roads.
Hollow Axles for Automobiles.

Popular Mechanics can be bought of any newsdealer in the United States.

QUEER BRIDGE IN CHICAGO.

One of the Oddest of the Many Odd Structures Spanning the Harbor in the Windy City.

One of the most peculiar of the peculiar bridges for which Chicago is noted spans a branch of the canal at Rockwell street. It is a combination movable and fixed span crossed by four railroad tracks operated by the Terminal Transfer company and the Chicago Junction railroad. It is one of the only two modern bridges of this type ever built, the other being at Buffalo. The construction is on the principle of the old-fashioned draw bridges famed in ancient English history.

This bridge was erected at the time the public demanded a change from the old type of swing bridges which were becoming a great menace to navigation. All kinds of queer looking designs made their appearance across the Chicago river and canal at this time, as told in the August 16 issue of Popular Mechanics. It was then that the Halsted street bridge, long considered the oddest bridge in the world, was built. The public was put to great inconvenience through many of these experiments but finally ideal types of bridges were born of the complications and Chicago will soon have, what many consider, the most perfect system of bridges of any city in the country.

The Rockwell street railroad bridge, shown on the title page, was designed by George E. Morrison, one of the most famous of American engineers. The movable half is raised on a hinge by steam power assisted by counterweights which roll up and down on the curved counterweight tracks, shown to the left in the illustration. When closed the free end of the movable span rests on a center pier. The power plant is located in the little elevated double room shown in the engraving. While this half of the bridge is raised and lowered to permit the passage of vessels the other half remains permanently closed, being a fixed span. It is believed to have been the original intention to make both of the spans movable but the bridge, it is said, was never completed. This bridge is on what is known as the west fork of the south branch of the Sanitary Canal. Mr. Morrison did not follow up his style of structure in his later successful bridge designs. The bridge failed to give the desired relief to traffic because it, too, contained the center pier, which is condemned in Chicago as being one of the greatest obstructions to navigation. It was the center pier that caused the great objection to the swing bridges. While this bridge has been in operation for a number of years it has never before been described.

VALUABLE FREE SCHOLARSHIP FOR SOME READER OF POPULAR MECHANICS.

Henry Beck, residing at 875 N. Halsted St., who has been a student for some time in the American School of Correspondence with offices at the Armour Institute of Technology, has just been awarded a certificate for a free scholarship in that school. He will be glad to turn this over to one of our readers who is anxious to study steam, electrical or mechanical engineering.

The free scholarship includes exactly the same instructions as the regular $50 scholarship.

Call or address, Henry Beck, 875 North Halsted St., Chicago.

The Four-Track News, the illustrated magazine of travel and education published by the New York Central R. R., grows more and more interesting each month. Many publications reach a high level and are able to maintain it, but the Four-Track News is a genuine mountain climber of progress.

The Tiger fish, pugnacious in appearance, is the most gentle of all fish, while the Ladyfish is as savage as a bull dog.

WALL TO SAVE GALVESTON FROM THE SEA.

Huge Embankment of Earth and Stone to Prevent a Recurrence of the Disastrous Flood of 1900.

Galveston, Tex., is relying on a great sea wall, now being built, to protect it from another flood, such as happened in September, 1900, when the sea swept over the city, occasioning one of the greatest disasters in history. Three miles of the wall are to be built along the ocean front. The wall stands 17 feet above the mean low water and 15 inches above the highest water in that greatest of all floods when the Island City was devastated. The wall is 5 feet thick at the top and 16 feet thick at the bottom, and rests upon piles protected from undermining by riprap. The foundations are being laid a little back from the usual high-water line and about three feet above mean high tide. Back of the wall the land is being filled in for a stretch of 200 feet. Thirty-five feet of this made ground nearest the wall will be paved with brick so as to provide a driveway of 30 feet. Next to the driveway, on the bay side of the filling, will be 60 feet of embankment planted with Bermuda grass.

RADICAL CHANGE FOR LONG ELECTRIC ROADS.

The electric lines running in cities use the direct current at a voltage of from 500 to 650 volts. Most of the country or interurban lines use the same system. As the theoretical loss in transmitting direct current through an ordinary trolley wire is 10 per cent per mile, there should be no power available at a point ten miles from the power house. This loss in actual practice is less than 10 per cent, but is so great that power houses must be placed at frequent intervals in long lines, or immense copper feeder wires requiring tons of copper and costing thousands of dollars must be used to conduct the power. More recent custom in long lines has been to generate an alternating current at high voltage, say 6,000 to 10,000 volts. This can be conducted on a comparatively small wire but has to be "transformed" at about every 10 miles into the direct current, which is then fed into the trolley wires. These "transforming" or sub-stations are really small power plants and require an attendant constantly. Engineers have for years worked to construct a car motor, which could be made to use the high voltage alternating current without the necessity of the sub-stations.

Some success has been had in Europe, but thus far little progress has been made here. The Westinghouse Company now announce a system which will be installed on the electric line between Washington, Baltimore and Annapolis, some 40 miles in length. Single-phase, alternating current will be transmitted at 15,000 volts to sub-stations, which will contain only stationary transformers, doing away with the present rotary machines and attendants, and feeding the trolley wire at 1,000 volts. The new cars will be 60 feet long, weigh 50 tons each, and run 60 miles an hour, with four 100-horse-power motors to each car. The motor is of a new design and construction.

If the expectations of the engineers are realized it will mean that on country lines one power house could furnish current to run cars from 50 to 100 miles in each direction. On this basis two power plants could run a line 400 miles long. When this is an accomplished fact one of the greatest objections to changing long steam roads to electric power will have been removed. It is well within the bounds of reasonable expectation, that many of the largest steam roads of today will be discarding their locomotives within the next decade, and passengers be carried from Chicago to New York, without the necessity for a single stop for coal and water.

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Tunnels a National Peril in Time of War

Whole Cities Could be Mined and Blown to Fragments by a Few Men of Mechanical Knowledge

In the event of war three of America's greatest cities would be imperiled by the net work of subteranean passageways under their principal streets. With bombs of dynamite or other even more powerful explosives recently invented in this country and Europe, these cities could be blown into atoms with little risk to the enemy. The United States could not possibly do anything that would add more greatly to the strategic advantages of a future enemy than to permit the building of these tunnels. The cities that are thus endangered by being undermined with the tunnel systems are New York, Chicago and Boston. In either of these municipalities, 100 men with less mechanical and inventive genius than an Edison could work more ruin than a whole fleet of warships even should the ships be allowed to ply their work of the destruction without opposition.

In America there are sympathizers of every country on the globe. Should war be declared with any nation there would be thousands of men here who would be ready to aid the opposing nation. Being already on the ground they could easily form a secret organization and with the advantages the United States, itself, has afforded them, by building these tunnels, they could inflict untold punishment on us, and escape with little danger of detection. But even without these sympathizers it would not be a very difficult matter for the enemy to slip spies into these cities from different points of the Americas to perform the work.

A spy could take passage in one of the cars for the operation of which the tunnels are being built, and, from a car window, drop a package of explosive timed to explode in say 30 seconds or a minute or two. With hundreds of thousands of passengers daily it would be impossible to prevent such people from using the cars.

Bombs of the most powerful explosives made into deceptive forms could by various methods be placed at intervals along the tunnels and set off mechanically at a given moment. Then there would be an explosion more terrible than an earthquake and possibly as disastrous as the eruption of Mount Pelee. The entire foundation of the city would be shattered. Skyscrapers would reel and fall and all structures along the routes of the tunnels would be demolished. Street cars, electric wires and the crazed populace would be buried in the mass of riven ruin; and the resultant conflagration that would soon sweep over the entire city would complete the work of devastation.

As to how easy it would be for an enemy to mine the tunnels it is but necessary to cite the instance in Chicago when a force of workmen slipped into that city and had the streets catacombed with the tunnels—as told in the May 17 issue of Popular Mechanics,—before the citizens or city officials knew that such work was going on. Here 100 miles of tunnels are

Rapid Transit Tunnel Entering Central Park—Looking Toward Lenox Ave.

being built under the business streets. In New York, 58 miles of subway are now in progress of construction. Illustrations showing this work were printed in the September 20 issue of Popular Mechanics.

Such an enormous amount of tunnel building is contemplated for New York that the metropolis may soon be known as the "City of Tunnels." The acompanying illustrations, showing the entrance of the tunnel into Central Park, and the digging of the great hole through rock under Broadway, will give an idea of the magnitude of the enterprise. The present system now building, however, is just the beginning. Of Manhattan,

Rand Drills at Work, Under Broadway and 181st Street—Tunnel Heading, New York Rapid Transit Subway.

only the west side is served with the underground rapid transit and an east side line is proposed to serve that densely inhabited district. A contract will soon be let for a subway from City Hall, New York to City Hall, Brooklyn, and beyond. This includes a subway down Broadway and a tunnel under the East river.

The Pennsylvania railroad company proposes to tunnel the North river, build a great station in the heart of New York, then continue in tunnel under the East river to connect with the Long Island railroad at Long Island City. Following their lead the New York Central is fostering a scheme for a tunnel along 42nd street east, then under East river to Long Island.

Thus when this vast amount of tunneling is completed America's metropolis will rest on a nest of longitudinal caves extending throughout the city's depth and breadth. While these subways may afford a great convenience in time of peace, in time of war they will become a menace to the nation.

WHO WOULD HAVE SUCCEEDED ROOSEVELT?

Had He Been Killed in the Recent Collision Hay Would Now Be President.

Should President Roosevelt have been killed in that collision in Massachusetts, who would have succeeded him? That is a question many have asked the editors of Popular Mechanics since the occurrence.

There being no vice-president, the president would have been succeeded by John Hay, the secretary of state. Should he, in turn be killed, or otherwise disabled, or if there should be no secretary of state, the secretary of the treasury would act as the nation's chief executive, and from this down the succession runs through the cabinet in this order: secretary of war, attorney general, postmaster general, secretary of the navy, secretary of the interior and secretary of agriculture. The order is the same as that of the creation of the department. Senator Frye, of Maine, was mistaken when he referred to himself as "acting vice-president." He is acting president of the senate and in that capacity performs duties that would be performed by the vice-president if there were one.

The Canadian Pacific railway has adopted a coupler for its passenger trains, by means of which the impact of the cars forming the train automatically couple the cars and connect the air and steam pipes without an attendant going between the cars.

LOCOMOTIVES OF A CENTURY.

In October, 1889, a successful compound locomotive (Fig. 40) was introduced by the Baldwin Locomotive works. Three followed in 1890, since which time nearly

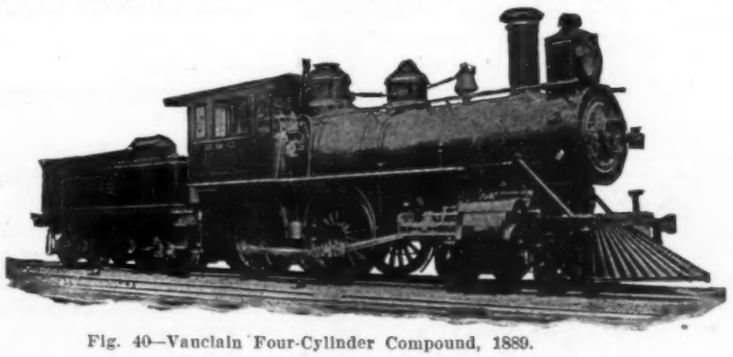

Fig. 40—Vauclain Four-Cylinder Compound, 1889.

2,000 have been built and are now sought by engineers in all parts of the world.

Successful two-cylinder compounds appeared about the same time, many of which are now in successful operation. One of these, in use on the Old Colony railroad, is shown in Fig. 41. The "Columbia" (Fig. 42) next appeared, in 1892, designed by Mr. William P. Henszey, who for nearly 50 years has been connected with the engineering department of the Baldwin Locomotive works, and who is said to have designed more locomotives than any other engineer living. He is now one of the senior members of the firm.

This new idea in locomotives was exhibited at the world's fair in Chicago in 1893 as the ideal of a high speed locomotive. It was tested thoroughly and demonstrated the wisdom of the designer, but gave place in 1895 to his more favored design, the "Atlantic" type, which will be described and illustrated in the next issue.

PRINCIPLES OF THE DYNAMO.

Few of us can watch a dynamo in operation without a feeling akin to awe, though the inspiration may arise from very different sources. To the layman it is little less than a miracle that the simple spinning

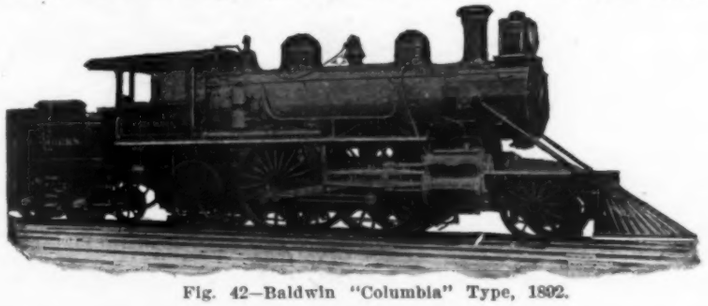

Fig. 42—Baldwin "Columbia" Type, 1892.

of a mass of iron and copper between the poles of a large magnet should suffice to light his house, carry him from place to place and do all the countless things for which to-day electricity is operative agent, says the Electrical Review.

What other great tool have we that can be compared to the electric dynamo in this respect? Here is nothing but a cylinder built of iron discs and wound over with copper wire, having suitable contact provided for conducting the electric energy away after it is set in activity. Then this barrel of metal is placed within a powerful magnetic field, suitable driving force is provided, and we have a servant capable of executing our most exacting commands and doing this with a willingness and promptness that can not be rivaled.

Here is a generator with an armature 16½ inches in diameter and 9 inches in length. The active surface is only 3¼ square feet, and yet we are told the output is 56 kilowatts or 75 horse-power. That is to say, this generator can do in one second the equivalent of lifting 20 tons one foot. How is this accomplished?

To gain a fair idea of the physical explanation, let us go back to the beginning, as far as 1819. In that year Oerstedt discovered the first connection between electricity and magnetism. He found that if a wire carrying an electric current from a battery—batteries in those days being the only source of electricity in quantity—was held in the neighborhood of a magnet, the magnet was affected and tended to set itself at right angles to the wire. This was a discovery of the greatest importance and led directly to the invention of the electro-magnet.

To-day nothing seems simpler to us than the method of doing this, but we must bear in mind the little that was known of physics at that time. It took Faraday, "prince of experimenters," as he has been called, until 1831 to discover the method. Simply it is this, Oerstedt's phenomena showed that a current flowing deflected a magnet. Faraday showed that if a magnet be moved in the neighborhood of the wire a current would be set up in the wire provided the circuit is closed. This fact represents the whole action of the dynamo. All that is necessary is relative motion between the magnet and the wire. Faraday's earlier apparatus differed in no essentials from the machine of to-day. A loop of wire, the end terminating in slip rings, or even a two-part commutator upon which the collecting brushes rested, was revolved within a magnetic field.

To-day we usually wind the wire over an iron cylinder, but this is simply to increase the capacity of the machine, and for the same reason we use many loops in place of the one or two employed by Faraday.

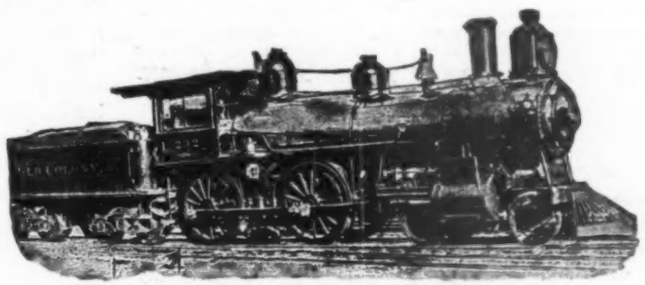

Fig. 41—Two-Cylinder Compound, Old Colony R. R.

J. P. Morgan and other members of the New York Yacht club are negotiating with the Herreshoffs for the building of another defender of the American cup, for which Sir Thomas Lipton has issued a challenge.

Popular Mechanics is becoming the great want medium for skilled mechanics and employers of skilled mechanics.

The White Star line is to build a steamer to be 20 feet longer and a few feet wider than the same company's steamer Cedric, now the largest liner in the world.

The Canadian Atlantic Railway company has constructed a private metalic-circuit telephone line between Ottawa and Depot Harbor on the Georgian Bay.

Some people say Popular Mechanics is the most interesting journal published.

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THE DEMAND FOR COMPETENT YOUNG MEN IN ENGINEERING WORK.

The young man who in these days approaches the point where he must decide on an occupation is often discouraged at what seems to be a solid wall without an opening. He usually cannot commence as his father did, when pluck and a pair of hands constituted a working outfit. He finds it hard to embark in any business of promise on account of the competition to be met in the great combinations of industry. But he need not be overanxious if he has the proper qualifications. Chemists are in great demand in a multitude of manufacturing concerns which a generation ago would not have known what to do with one. Processes are critically watched and compared from day to day; new combinations are being constantly tried with a view to securing better quality at less expense. The competent microscopist finds people waiting for him to explain secrets invisible to the naked eye. Architects require men who can figure the strength of steel and concrete as well as make a tracing or blueprint. The plumber finds use for the young man who can not only wipe a joint, but who can meet the architects and figure on specifications. The setting up of heating apparatus—either hot air, water or steam—is so closely related now to proper ventilation that the ability to locate the air currents in advance often means the success or failure of an expensive heating plant. Railroads require more experienced help in all departments than ever before. Steel and iron works are constantly looking for young men with brains. Nearly every large factory has its own electric plant for light and power and needs one or more electrical engineers. Machinery and the science of mechanics enter into every avenue of business more and more every day.

There is a brilliant future in irrigation engineering, and builders of good roads will be steadily increasing in demand. Fortunes will be made in utilizing what are now waste products and turning them into useful materials. And so one might go on adding opportunity to opportunity.

One important feature must not be overlooked. A high-school or college education must be supplemented by technical study and practice if the young man expects to fill these positions. He cannot have too much knowledge of the subject of his choice. He must understand its details from the simplest kind of work on up if he succeeds. If a brdge engineer, he must know how much sand a man should shovel in a day.

The young man will have to know more than his father at his age, but he will be better paid.

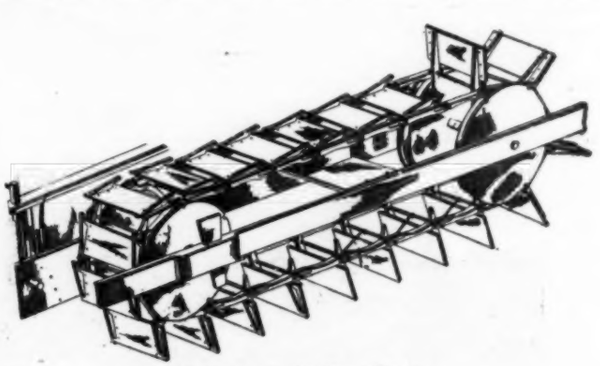
FINEST BROWN PAINT MADE FROM MUMMIES.

Embalmed Bodies Taken from the Egyptian Mausoleums and Ground Into a Coloring That Is the Artists' Delight.

Probably the most useful race of people that ever lived were the Egyptians. Not only their arts, laws and customs endure forever, but it seems that their very bodies will exist and be a source of use for all time to come. Egyptian mummies have long been an attraction in museums, and have always commanded a big price. An embalmed Egyptian that has been deprived of life for thousands of years is now worth more today than many living Americans, from a commercial standpoint. But these embalmed relics of the Egyptian mausoleums now serve a still more valuable purpose. They have become the basis of a new and important industry. From them are made the finest brown paint known, a paint used on very special work. When we gaze on the richest brown hue of an oil painting we may be unconsciously admiring the remains of a once famed Egyptian princess. When a person died in the East a century or two before Christ the body was preserved in the finest bitumen. The remains of a body thus treated in those times, on being unwrapped to-day, present an appearance similar to light colored leather. The bitumen and the leather-like remains are ground down by machinery and turned into a beautiful brown liquid paint, the delight of all artists. It is said that the big color dealers generally keep a mummy locked away in an air-tight case for use when required. A single one will last for years and make a stupendous amount of color.

ENDLESS PROPELLER.

A new form of propeller for use on boats running in shallow water has been invented by Adam Kuentz, of Colby, Wis. It occupies less space than the side wheel paddles of river



For Boats in Shallow Water.

steamers and is expected to give more power than the stern wheels. It can be made as long as the boat and placed beneath the hull in the center. The cut shows the manner of its operation.

Capt. Joseph E. Maxfield has been rendered insane by the arduous duties experienced while in charge of the army's signal work in Alaska.

WATER POWER TO BE FRANCE'S SALVATION.

Scarcity of Coal Makes It Imperative to Look to Alpine Streams to Aid Commerce.

Water power from the Alpine streams is to be utilized in France as a means of re-establishing the country commercially and enabling it to combat increasing American industrial competition. In these streams, it is declared, lies the one hope of French industry and commerce. France at present is compelled to import two-thirds of the coal used for manufacturing purposes, from Belgium, England and even America. This so increased the cost of production that American manufactured products are now being sold in France cheaper than the cost price of French manufacture. The plan is now to do away with coal for heating and steam for manufactures, and substitute for it the application of hydraulic power, in which France is the richest country in Europe. It is predicted that this resolution, if carried out, will work a veritable revolution in French industry and may react profoundly upon the world. The utilization of water power will permit the working of the rich deposits of mineral in the Alps and Pyranees, which heretofore has been deemed impossible because of the expense of hoisting steam apparatus to the necessary heights. These mountains are said to be capable of furnishing a force equal to 10,000,000 horse-power per annum. The hydraulic force would be applied to all lines of industry either on the spot or carried off for the generation of electricity. Fifty thousand waterfalls are already turned to advantage in France, representing annually 575,000 horse-power, enabling factories to run at a cost of generally one-fourth of what the same establishments would cost when run by steam. The cost of steam power in France amounts to about $60 per-horse-power per year. In the Alps contracts are now being made to furnish the hydraulic force at from $6 to $10 per horse-power per year.

BROILED CORN BETTER THAN BOILED.

The boys of 30 years ago knew a good thing when they used to go out and forage in a field of corn and roast the juicy ears over a fire. Of late years people have forgotten all about this, but in boiling sweet corn instead of roasting it, they are missing one of the best things in the eating line.

A prominent physician in Chicago, who has a fine summer home, hands us the following: "Corn broiled is as much more delicious than that which is boiled, as a roast of meat is superior to meat that is boiled. The inclosed sketch shows a broiler

Home Made Corn Toaster.

for corn on the cob which any boy can easily make by twisting a piece of galvanized wire. Bring the ends to a right angle, sharpen them to a point with a file, and there will be sufficient spring to hold the ear firmly while being roasted. About three minutes is sufficient over an ordinary cook stove with the lid removed. Make a few of these corn toasters and give a green corn roast party. It's great fun."

Sir Thomas Lipton's next challenger for the American cup will be built entirely of steel.

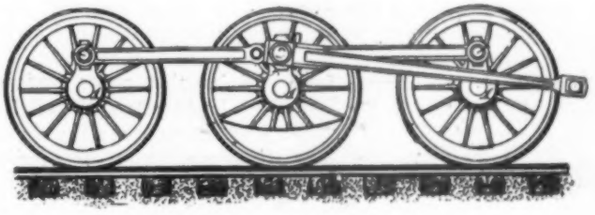
MACHINE WORKS TONGUE AND REVIVES LIFE.

Electrical Device that Prevents Death Even After Complete Asphyxiation.

Dr. Laborde, of Paris, who has carried on extensive investigation on the effect of tongue traction as a means of resuscitation, maintains that often, even when the organism has ceased to live externally, it still lives internally. That is to say, life is still latent; and as long as there is latent life there is hope of saving an asphyxiated person. The function which it is most necessary to revive is respiration. Experimenting upon dogs, it was found that two or three hours after apparent death had set in it was possible to secure resuscitation. The subject of the experiments was a vigorous bull pup which was several times chloroformed, and revived by rhythmically drawing the tongue in and out. In the final experiment complete asphyxiation occurred and traction was not resorted to until five minutes afterward. The dog this time appeared to be really dead. Two hours work produced no apparent results. In another half hour a respiratory cough showed that life was still present. The dog soon revived. The doctor devised an apparatus driven by clock work that pulled the tongue out at regular intervals. He has now invented a more improved device which is operated by an electric motor, the current being supplied by a secondary battery. With this instrument it is possible to subject the tongue to continuous traction for three hours.

BALANCED LOCOMOTIVE DRIVER.

A few months ago Popular Mechanics published a communication from a locomotive engineer suggesting a different dis-



Balanced Driving Wheels.

tribution of the balance weight in a locomotive driving wheel. L. H. Kenyon, of Allegheny, has taken out a patent on an annular counterbalance having its center of gravity eccentric to that of the driving wheel.

PIN PRICKING SYSTEM OF RESTORING HEALTH.

Pantopathy, or "the pin pricking system," is running riot among a certain element in Chicago. Women, many of them of high social standing, often have their flesh under their clothing made raw as a result of sticking, or having themselves stuck, with pins and needles. It cures them, they say, of any ailment they may possess and to argue with them that their theory is fallacious is worse than useless. There are a half dozen or more "pantopaths" who are kept busy administering the strange treatment to the Chicago health seekers. The patient is first made as nearly well as possible by proper exercise and vegetable diet, and then the skin abrasion takes place as a means of perfecting the cure. Pantopathy is really a latter day reincarnation of the ancient German medical theory, that by breaking or pricking the skin, the impurities or diseased conditions of the body are eliminated, and the way paved to renewed and perfect health.

Popular Mechanics prints the best of the best things published.

HOW TO MAKE A MARINER'S COMPASS.

By J. J. Rezab.

This compass is easily made and for ordinary purposes is very efficient. Almost all that is necessary is an old alarm clock, one probably which has the main spring broken; one with a round case. Take out the spring, shaping it into the form in Fig. 1, B, 3¼ inches long and 5-16 inch wide at its greatest breadth. Also drill a hole ⅛ inch in diameter exactly in the center. Mag-

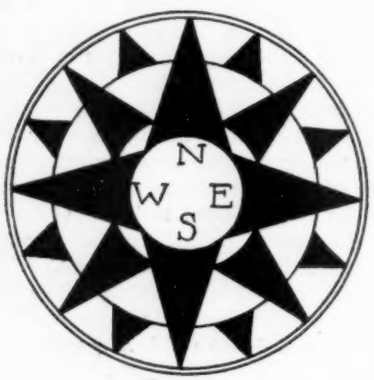


Fig. 2

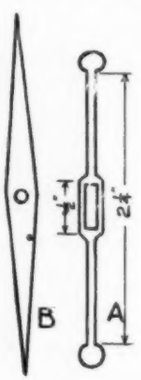


Fig. 1

netize it now either with another magnet or by placing it for a while on the field magnet of a dynamo or motor. The screw, F, and the nut, H, Fig. 3, is made from one of the pillars which support the works of the clock. File two sides of the head parallel by which the screw can be held when the nut is screwed on. The threaded part is ⅛ inch long and ⅛ inch thick. Into the threaded end of the screw bore a slight hole with an 1-16 inch drill (see illustration).

The compass card is made from stiff, but thin, paper, preferably white, formed as in Fig. 2, 3½ ins. in diameter, W, and E, standing for the cardinal points west and east respectively; north of course being the top, and south the bottom. A balancer must now be made. Procure a thin piece of sheet brass, cutting it out into the shape, A, Fig. 1, with the dimensions as shown. The center, which is the widest part, is ¼ inch in width. With a cold chisel cut out the slit ⅛ inch by ⅜ inch. At each end solder a ball of solder about ¼ inch in diameter. Then bend each end at the place where it begins to narrow so as to hang about midway between the compass card, D, and the base or cover, C, Fig. 3. All is now in readiness for putting the balancing part of the compass together. First pass the screw through the needle, then the card, and finally through the balancer.

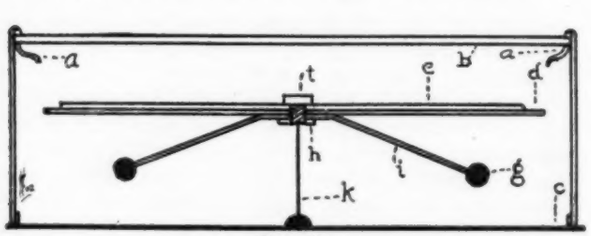


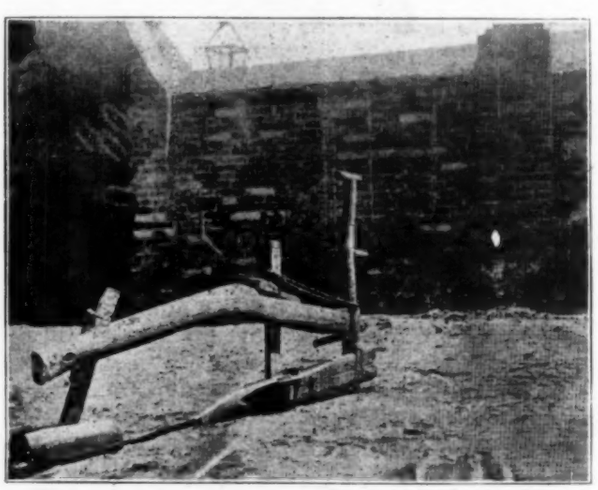
Fig. 3

To hold the parts firmly together screw on the nut. The north of the needle must lie on the north of the card. Temporarily any point may be used to test the balancing power. Any deviation can be remedied by a slight moving in either direction of the balancer until a perfect balance is obtained. Supposing this to be done, we proceed to fix it in a case. The clock case comes handy at this point if it has not been thrown away. With a tinsmith's shears cut off the part of the case so that only a width of 1½ inches remain. The bottom must here be understood as that part which is beneath when the face of the clock is uppermost. It also is the cover. As the piece of glass is loose that must be secured. There is a collar, A, A, which presses against the dial plate and so holds the glass in position; by soldering the collar to the side of the case it will hold it quite firmly. Now take a steel needle, making it ¾ inch long. Then solder the broken end to the center of the cover C, with the pointed end upwards. (See K.) An idea of the arrangement can be better gotten from the illustration, the glass being, B; the bottom, C; the standing needle, K; the compass needle, E; the card, D; etc. To complete the compass, place the card with the magnetic needle over the point and cover it by placing the cover over it.

NEW FIELD FOR AMERICAN FARM IMPLEMENTS.

By United States Consul Miller at Niuchwang, China.

North China, Mongolia, Manchuria and that part of Siberia bordering on the Pacific are destined soon to become consumers of American agricultural imlements. The greater part of this country is susceptible of cultivation. The production of wheat is already a leading industry in various localities. It is carried on without the use of any modern machinery; but in spite of


The Chinese Plow.

these crude methods the wheat usually sells at about one-half the price paid for wheat in the United States.

This country is not, as a rule, thickly populated. Laborers are imported each season to assist in harvesting and planting crops. There exists therefore more of a disposition to save labor than is generally found in other parts of China. The opening of the country by railroads will reduce the cost of getting the products to market and at the same time increase the supply. The market if secured and cultivated, will receive millions of plows, and other farm implements in like proportion.

LOWERS WORLD'S MOTOR CAR RECORD.

Amazing speeds were reached in the motor car races at Beauville, France, recently, in the presence of a great crowd of fashionable people. The chief event was the race for the kilometer championship of the world, which was won by Gabriel. He made the distance in 26 2-5 seconds, which is at the rate of 84 miles per hour. W. K. Vanderbilt, Jr., made the distance in 29 2-5 seconds a short time ago, but this record was subsequently lowered by C. Jarrott to 28 1-5 seconds. The race for motor cycles weighing 500 pounds was won by Rigal, who made the kilometer (1,093 11-18 yards) in 28 4-5 seconds, which is at the rate of 78 miles an hour.

IDEAL TRAVELING FIRE GRATE.

Invention of Two Chicagoans Does Away With Old Time Objections to This Machine.

A traveling fire grate which has recently been invented by two Chicago men, is believed to have solved a problem with which inventors have long been wrestling. This grate, which may be regarded as something of a mechanical marvel, seems to wipe away every objection that has obtained in the grates that have been placed on the market in former times. The device, besides its many other advantages, is a perfect smoke consumer. It is very light, being only about half the weight of the ordinary grate. Because of the interchangeability of its parts and its remarkable simplicity, one man is able to build the largest size of grates. The grate sections are easily removed and replaced while the mechanism is in operation. Its parts are so modeled as to admit of expansion and contraction as to size, so that the grate can be built in any desired length or width without the necessity of having new patterns made. The frame is built entirely of ordinary wrought iron I-beams and channel irons, and to change the length of these is all that is required to adapt it to the various sizes required in different plants. The grate has a perfectly straight forward and backward movement; the parts operating the mechanism are so disposed with relation to the fire as to not be affected by the usual metal expansion and contraction which seriously interfere with the working of many of the old forms of grates. Hence no take-up is required.

The great objections to the former devices of the kind have been their great weight, complex mechanism, which made them extremely difficult to erect, and their being so modeled as to not permit of variations of size without change of models. Probably the most commendable feature of the new invention is the low price at which it may be manufactured.

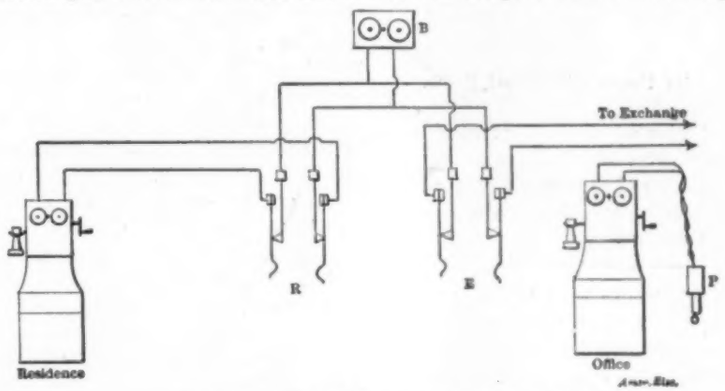
The inventors, not being in a position themselves to place the grate upon the market, are negotiating through Mr. Robert Klotz, mechanical expert, 1803 Schiller Building, for the sale of the United States patent rights. A very complete model one-eighth full size may be seen at any time in Mr. Klotz's office.

OLDEST HORSE IN AMERICA.

What was believed to be the oldest horse in America has just died at Finlayville, Pa., at the age of 39 years and 3 months. The animal was owned by John P. Sheplar, of Snowden township. At the age of 22 years the hores paced a mile heat at Homewood Park, Pittsburg, in 2:30. It was of the St. Lawrence strain and had been owned by Mr. Sheplar since it was 2 years of age. It was worked at the plow and on the farm for 36 years and had never been sick until 2 hours before its death.

CONNECTING AN EXTRA TELEPHONE.

An arrangement whereby a telephone subscriber can connect his private office or residence on his office telephone, while subscribing for only a single instrument, is described in the American Electrician. The office telephone set is connected to an ordinary two-wire plug, P, and two spring jacks, R and E, are provided, into either of which this plug may be inserted. With the plug inserted in the jack R, the residence instrument and the office instrument are connected together, leaving only the bridging bell, B, connected to the exchange circuit. With the plug inserted in the jack E, the office instrument is connected to the exchange wires, and the residence line terminates at the bridging bell, B. With the plug removed, as shown in the diagram, the residence instrument is connected straight through to the exchange.



CONNECTIONS FOR OFFICE AND RESIDENCE LINE.

The provision of the bridging bell, B, enables the exchange to call up the office when the office instrument is connected to the residence line, and also enables the residence to call up the office when the office instrument is connected to the exchange line. The plug would be withdrawn from the jacks, leaving the residence connected through to the exchange, only over night and during such other periods as the office might be closed.

"No reliable system of wireless telegraphy has yet been developed,"—Rear Admiral Royal T. Bradford, chief of the United States Bureau of Equipment.

Popular Mechanics is written so you can understand it.

The Louisiana Purchase states contain 63,000 miles railway, nearly one-third the total of the United States. These figures do not include second tracks and sidings.

SMALLEST STILL IN THE WORLD.

Moonshiner Made Whiskey with It in an Atlanta Park.

Wild mountain haunts and hazardous trails are usually searched by United States revenue officers for illicit stills. Hence it was with considerable surprise to the entire government service that a "moonshiner," busy at his forbidden trade, was discovered in the quiet shade of a public park in Atlanta, Ga. The "moonshiner" made his escape but his still was captured. This still is the smallest on record. It is what is known as a "parlor still," but none so small was ever seen before. It was made of an old 1-quart milk can and a gallon paint can. The paint can was used as the tank. A tiny tin funnel inverted on top of the milk can and 24 inches of small copper tubing were used for a worm. For the fire required in distilling the liquor the operator used charcoal obtained by burning the bark of trees. This gave little smoke and lessened the chances of detection.

PEBBLED LEATHER.

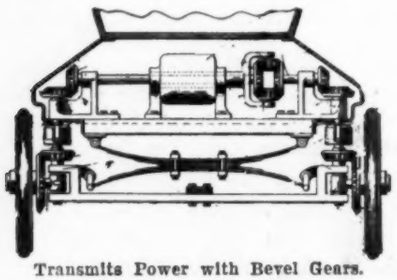
This new wrinkle in leather is produced by taking two pieces of sheet leather when soft and arranging flat pebbles of assorted sizes between the two. A weight or pressure is then applied until the leather has taken the form of the stones. When dry, what is known as "pebbled" leather is the result.

Leather Takes the Form of Stones.

Popular Mechanics gleans from publications all over the world the best of the best things published.

NEW DRIVING GEAR FOR AUTOS.

One of the latest inventions in running gear for motor vehicles is that devised by J. H. Hoadley, New York. The motor transmits its power to the wheels by means



Transmits Power with Bevel Gears.

of a bevel gear which not only causes the wheels to revolve but permits them to be turned in either direction while in action. It can be applied to either steam, gasoline or electric motors.

The Smith family is to have a building at the St. Louis World's Fair, to be the headquarters of all its members. It is estimated that there are 14,000,000 Smiths in the world.

The more you read Popular Mechanics the better you will like it.

HOLLOW AXLES FOR AUTOMOBILES.

French automobile manufacturers have already borrowed several features from the construction of artillery engineers. Now they are using hollow axles patterned after those in service in field pieces. The method of manufacture is detailed in "La France Automobile." In making the artillery axle a bar of medium hard steel is taken whose tensile strength is about 80,000 pounds per square inch, and which will endure

FIG. 1

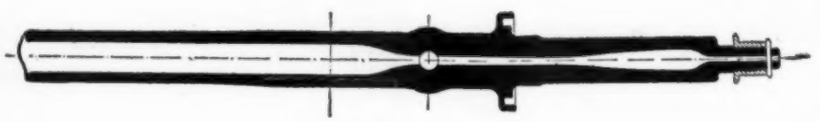


FIG. 2

an elongation of 20 to 25 per cent. This bar, of a diameter equal to the largest part of the axle is roughed out in the lathe, and then bored out from end to end to the largest diameter which the hole through it must have, as shown in Fig. 1. The bar is then heated to redness and plunged in water, and then annealed. This makes the metal tougher, of closer grain and highly elastic. The spindle ends are then forged tapering, reducing at those points the originally cylindrical hole, while the hammering hardens the surfaces of the spindles and gives them better bearing qualities. At the same time they are bent to the requisite camber. This camber, whose effect is to cause the hub to press inwardly against the axle collar, and the more as the angle is greater, is considerable in this case, artillery spindles being bent 7 degrees. The axle is then finished in a lathe.

In the automobile axle nickel steel is used containing 8 to 12 per cent nickel, which combination has been known to stand a test of 230,000 pounds before breaking. The bar is then forged to produce on its surface enlargements corresponding to the volume of metal desired in the interior. It is then bored, and returned to the forge, where the enlargements are driven in until the axle is reduced to the same exterior diameter throughout. It is then tempered and annealed, and the spindles given the necessary camber, which is slight. Lathe work completes the process. A portion of an auto axle thus completed is seen in Fig. 2.

ARKANSAS THE PLACE.

An Arkansas man had some trees to cut last spring but a cyclone came and leveled them and saved him the trouble. He had a brush pile to burn, but lightning struck it and burned it for him and now he is waiting for an earthquake to come and dig his potatoes and break his land for wheat sowing.

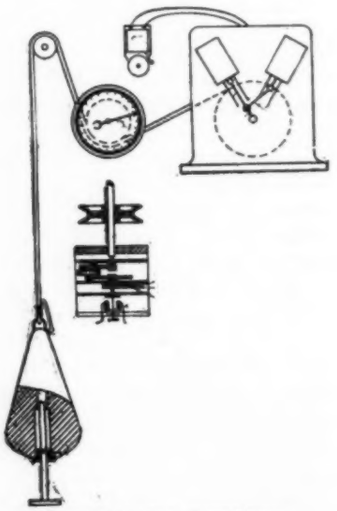
BEARS PREDICT A COLD WINTER.

According to the keepers of public zoos where bears form part of the collection, the coming winter will be something proper. The bears are eating all they can and howling for more, the explanation being that nature warns them of a long siege ahead, and they are getting ready for it, just as they would if roaming in the forests.

The Hawaiian Board of Health has decided to test the possibilities of the X-ray treatment of leprosy.

INSTRUMENT FOR DEEP SEA MEASUREMENT

An electric instrument for deep sea soundings has been made by E. Krumhoff, of Sontra, Germany. The weight, which is of lead, has a sort of push button in the lower end. Wires connect the weight with the boat on the surface. When the weight



For Deep Sea Soundings.

touches bottom the push button is pressed into the weight, making contact between the two wires and a bell in the boat is rung. As the weight descends the wires pass over a pulley which turns a dial marked with distances and a pointer shows the exact number of feet the weight has gone down.

MILK IN POWDER FORM.

The housewife may now buy her milk in powder form, put it away in a box and use it for various purposes whenever desired by merely adding a little water. The powder will keep for almost any desired length of time and the milk made from it can scarcely be detected from the original. It is made by a special process of evaporation from the skim milk taken direct from the separator within one hour from its delivery by the farmer. The powder represents all the solid or nourishing parts of milk except butter fat. The milk is thoroughly sterilized during the process. The product is sold in paper-lined wooden drums and is especially adapted to the use of bakers. A 50-pound drum of the powder is the equivalent for baking purposes of 100 gallons of skimmed milk. It may be mixed dry with the flour and requires no special instructions.

The down town conduits of the great Chicago tunnel will be completed and the installation of telephones begun by December, and by February 10,000 telephones will be in use.

SPECTACULAR FIRE AT PORT HURON, MICH.

The burning of the great McMorran elevators at Port Huron, Mich., produced one of the most spectacular fires ever witnessed. This is one of the greatest aggregation of elevators in America. They were filled with grain when the fire started in an upper bin. It spread with wonderful rapidity, casting a maze of light over the entire city. The picture herewith reproduced was taken when the great sheets of flame enveloped the roofs of the several buildings, ranging from the lowest to the highest, while the darkened walls seemed sandwiched in between. Above rolled the black clouds of smoke, which with the flames were driven eastward by the strong westerly wind. This is one of the numerous elevator fires of late years that have occasioned an innovation in elevator construction. The newer types are built of less inflammable material, the latest being of concrete and many of iron.

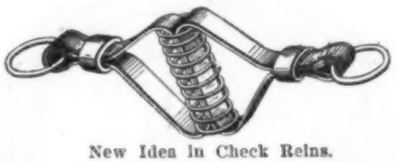
Burning of the Great Elevators at Port Huron.

DELIVERS MILK IN AUTOMOBILE.

Herbert Crane, a dairyman, of Racine, Wis., delivers milk in an automobile. He does not do this, he says, to appear up-to-date or to make a better appearance than his contemporaries, but simply because he finds it more economical than the old milk wagon propelled by horses. The cost of running the automobile, he says, amounts to but 15 or 20 cents a day, which is far cheaper than the horse and wagon. Besides the motor vehicle makes much the better speed and thus he is able to cover a larger territory in a given time. Then the automobile has decidedly the greater endurance. To the rear of the motor vehicle he has attached a device in which he carries three large cans of milk. The entire vehicle is covered with a canopy top.

ELASTIC CHECK REIN.

John N. Chaffin, of Red Cloud, Neb., has a new idea in check reins which is so simple no further description is necessary than an examination of the illustration. The spiral spring keeps the rein tight, but permits a certain amount of movement.



New Idea in Check Reins.

PAY FOR WINE BY THE HOUR.

In the province of Padua, Italy, the price of wine is unprecedentedly low, owing to the enormous overproduction. In some districts the guests in the osterias, or inns, pay by the hour for the wine consumed. Wine is rarely sold for money, but usually bartered for milk, maize and fowls.

WATER POWER FROM ARTESIAN WELL.

St. Augustine, Fla., has an oddity in the way of industrial machinery in the shape of a water-power wheel driven by an artesian well. It supplies power to a wood-working shop. The wheel is 16 feet in diameter, the well 6½ inches and 240 feet deep. Since the well does not supply power enough, however, a second well has been driven near by to reinforce the present one. The new well is eight inches in diameter.

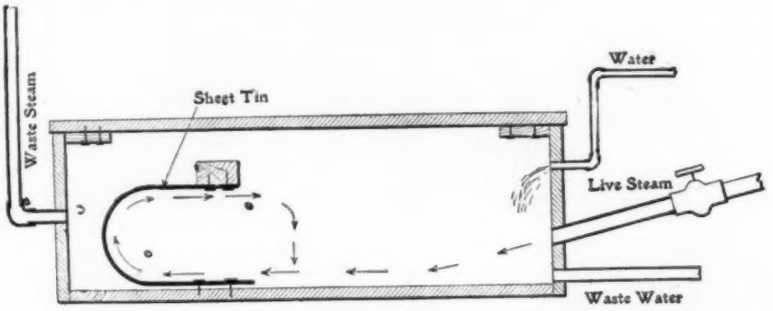
ELECTRIC ROULETTE WHEEL.

A roulette wheel, whose operations may be secretly controlled by electricity, has recently been imported to Chicago from Paris and placed in service in a gambling clubhouse on Michigan avenue, near Twelfth street. The apparatus is constructed so that the wheel may be stopped at any desired point—number or color—and with greater ease and less chance of detection than the other mechanically "fixed" wheels that in the past have been used for robbing the uninitiated. The wheel was imported for the entertainment of certain Chicago men of wealth, whose names have received considerable publicity recently in connection with racing and games of chance. One of these confiding individuals has already lost $10,000 by waging money on its rotation.

SHOP NOTES

DEVICE FOR WASHING OVERALLS.

In the boiler house of the Union Steel Co., at Honora, Pa., the men have constructed a device for washing overalls, which will take the dirt and grease out of the worst possible specimen, and do it quickly. The sketch shows the machine. The American Machinist says:



FOR WASHING OVERALLS.

The overalls are put in and the lid is closed, a fine stream of cold water is turned on, the live steam is started and they are then left to wash themselves. There must not be over an inch of water in the bottom. The live steam strikes the cloth and carries it in the direction of the arrows to the sheet tin. The cloth is compelled to follow the curve of the tin up and around. Then it drops in the stream of steam and water again, and so on. As it works in practice the cloth is passing around the tin continuously, being kneaded and turned in the hot water until it is perfectly clean. No soap was used, yet no doubt it would have shortened the time. An ordinarily dirty pair of overalls would be cleaned in two or three minutes. The box is about 4 feet long, 3 feet wide and 2 feet deep, but could perhaps be made smaller without harm. If too much water is used in the bottom, the steam tears the cloth instead of moving it.

STRIPPING SILVER FROM PLATED ARTICLES.

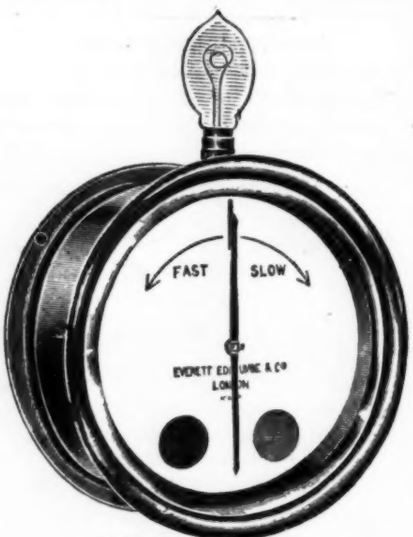
When a silvering operation has failed, or the silver is to be stripped from old silvered articles, different methods have to be used according to the nature of the basis-metal, says American Electrician.

Silvered iron articles are treated as the anode in a potassium cyanide solution in water (1 to 20), the iron not being attacked by potassium cyanide. As cathode a few silver anodes or a sheet of copper rubbed with an oily rag is suspended in the solution. The silver precipitates upon the copper sheet, but does not adhere to it. Articles, the basis of which is copper, are best stripped by immersion in a mixture of equal parts of fuming sulphuric acid and nitric acid. This mixture makes the copper passive, while the silver is dissolved. Care must however be taken not to introduce any water into the acids nor to let them stand without being hermetically closed, since by absorbing moisture from the air they become dilute and may then exert a dissolving effect upon the copper.

NEW ROTARY SYNCHRONIZER.

Now that long distance alternating current transmissions are becoming so common in connection with traction schemes, the new Everett-Edgcumbe rotary synchronizer should attract attention, says the London Electrical Times.

It consists essentially of a two-phase rotary field motor, the stator of which is fed from the bus-bars, and the rotor from the machine to be paralleled, the split phase being produced by means of a choking coil. If the incoming machine is running too fast, the hand will revolve to the left, and if too slow to the right. The correct speed, or rather frequency, is shown by the hand remaining at rest, and the precise moment for switching in is shown by the hand standing vertically and opposite a mark on the dial. It is said that a novice can parallel even the largest machine with absolute safety, and in far less time than could an expert with the old-fashioned gear.



The New Synchronizer.

HOW TO MAKE A SPARKING COIL.

For a sparking or induction coil strong enough to ignite paper or cloth make a magnet core of a bundle of soft No. 20 iron wire ¾ inch in diameter and 6 inches in length, wrapped in two thicknesses of strong paper laid with shellac varnish for insulation. Put thin wooden spool heads on the ends of the core wrapping, fastened with shellac varnish, says the Metal Worker.

Then wind the spool with four layers of No. 16 cotton covered copper wire, with shellac varnish on each layer, passing the wire ends through holes in the spool head at the level of the last layer. Cover the coil with four thicknesses of wrapping paper well shellacked for insulation from the secondary current.

For the secondary coil, wind with 12 ounces of No. 34 double silk covered copper wire, commencing by passing the wire through a hole in the spool head close to the paper winding of the primary coil. Cover each winding of the secondary coil with two thicknesses of wrapping paper, well shellacked to make the insulation perfect against short circuiting of the secondary current. Special care in closing each paper winding against the spool heads is very essential to prevent burning out. Dry the shellac varnish as the work proceeds.

With 10 medium sized dry batteries in series, a 1¼-inch spark may be obtained between wire terminals or a ½-inch hot spark between brass balls of ¾ inch in diameter. With eight Edison-Leclanche cells and a vibrating attachment, a brilliant spark effect may be had between the brass balls.

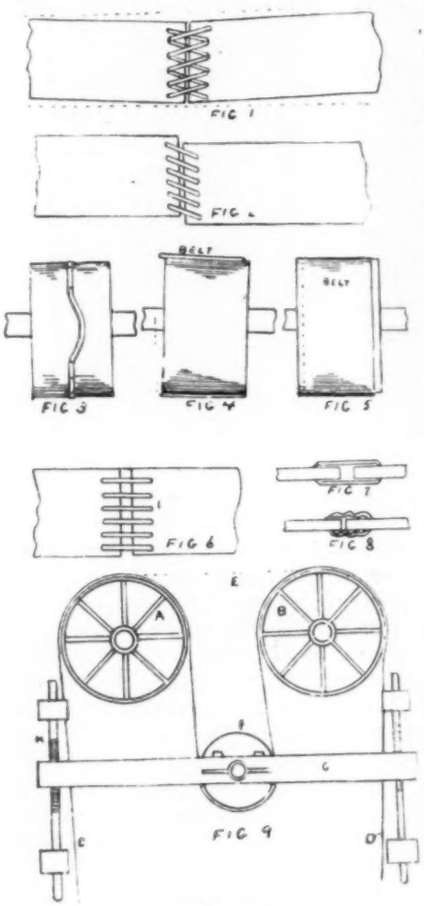
NEW SOLDER FOR ALUMINUM.

In a paper read before the Society of Arts, Prof. E. Wilson recommends the following composition as a successful solder for aluminum. The constituents are 28 lbs. of block tin, 3.5 lbs. lead, 7 lbs. spelter, and 14 lbs. phosphor-tin. The phosphor-tin should contain 10 per cent phosphorus. Clean off all dirt and grease from the surface of the metal with benzine, apply the solder with a copper bit, and when the molten solder covers the metal, scratch through the solder with a wire brush.

SWAYING OF BELTS.

Swaying of belts is often caused by pulleys not being in line, unevenness of leather in thickness along the edges, a want of balance and defective connections of the belts, says a writer in Age of Steel.

If the connecting ends are cut so as to lace as shown in Fig. 1, the belt will sway. Only perfectly square ends will answer for lacing correctly. If the union of the ends is like that shown in Fig. 2, the belt



SWAYING BELTS.

will sway. If a leader on one of the pulleys as shown in Fig. 3 is loose, the belt will be caused to jump from side to side.

Of course if the belt is too slack it will sway. The theory has been advanced that a slack belt will transmit more power with less friction than a tight belt. This is correct as far as it goes, but there is a limit. The proper amount of the sag is as follows: When pulleys are 20 feet apart, allow about 2 inches; when pulleys are 25 feet apart, allow about 3 inches; when pulleys are 30 feet apart, allow about 6 inches. If one of the pulleys is uneven on the shaft as in Fig. 4, the belt will run to the high side and cause swaying. If tipped the other way the result is as shown in Fig. 5. Atmospheric changes have a good deal to do with belts. It is quite an easy matter to ascertain when the belts are running slack or tight, or to observe when the air is dry or moist, but quite another matter to know how much loss and gain in water vapor is sufficient to cause a change in the conditions of the belting. It may be of value to mill men to know under what conditions of atmospheric change this is brought about. It is often observed in starting machines after they have been stopped over night, that the belts slip on the tight pulleys, and as a result the machines do not start readily. One reason for this is that the moisture of the air has entered the pores of the leather. Atmospheric changes probably will not affect old belts so readily as in the case of new ones, because, with an old belt or one that has been running four or five years, the pores have become filled with oil and tallow and other substances that have been applied and will not absorb moisture so readily. The effect of any decline in the temperature will be a condensation of the vapor being given up to make up for the loss of heat. This condensed water in the form of minute globules will collect upon the belts and other objects in the room until it will be observed that they have become moist, when, perhaps, the inflow of steam will be stopped. The temperature of the room, although falling, has not reached a point where it becomes uncomfortable to the workers, yet it affects the belts. Hence the need of correct and uniform temperature in order to get a good belt service. The dampness absorbed by leather increases the load and hinders an effective service. Laced belts often break where connected, on account of friction caused by slipping and movement where the butts come together. Fig. 7 shows a side view of a sewing in which the ends of the belt fail to meet. At times the ends come together as in Fig. 8. This soon wears the lace. In running belts from a floor below recently, we had considerable trouble until we adopted the plan in Fig. 9. The pulley (a) and (b) had to be driven from shafting below. First the belt was put over both pulleys as marked by the line (e). This would not work. Then we fixed up the extra pulley (f) and set it in a bearing in the frame piece (g). The latter was held in place by the rods (h, h), these in turn bearing in adjacent supports. Thus to regulate the tightness of the belt (C) and (D) it was only necessary to turn these rods, as they are cut with a thread. This system works all right.

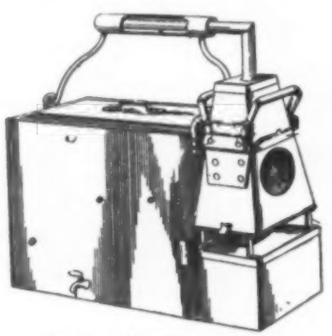
NITRIC ACID MADE FROM AIR.

We were taught that one cannot make something out of nothing, but the electric chemists have succeeded in practically doing this very thing. Nitric acid worth $100 a ton is now being made from air. Electricity is the agent. A steel tank in the form of a cylinder constitutes the nitrifying chamber. This is filled with several hundred electric arcs or flames, which are constantly flashing and going out. A 10,000-volt dynamo furnishes the electric current. A blower forces the air into the tank where the electric arcs turn it into gases. The nitrogen gas is drawn in an absorption tower, where the nitric acid is precipitated. By this process the acid is produced at a cost of 1.6 cents per pound. It sells for 5 cents per pound.

The tank is three feet in diameter and six feet high. The arcs are from six to eight inches long. A 2,000-horse-power motor operates the plant, and is driven from Niagara Falls power, at which city the factory is located.

DINNER PAIL HEATER.

The man who is working far from home and remote from any friendly steam boiler where he can set his pail to warm, can now have a hot meal on a few moments'

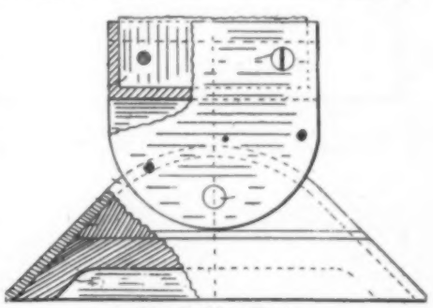


Hot Air Warms the Pail.

notice. A Michigan man has invented a small heater which is attached to the pail, operated by a small lamp. When lighted a current of hot air passes through the pail, warming the contents as much as may be desired.

SOLID FOOT FOR LADDERS.

A St. Louis man has brought out an attachment to be slipped on to the posts of ladders when used on stone walks or



The Ladder Foot.

other slippery places. These feet are made of rubber and will not slide, while permitting the ladder to be set at any practical angle.

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STRANGE DUEL IN TEXAS.

A peculiar condition of affairs has resulted from a duel recently fought in Texas between Alexander Shott and John S. Nott. Although it is not known which of the duelists was injured it is the general opinion that Nott was shot and Shott was not. In this case it is better to be Shott than Nott. Nott's friends declare that Nott was not Shott, and Shott avows that he shot Nott, which proves either that the shot shot at Nott was not shot or that Nott was shot notwithstanding. Circumstantial evidence is not always good. It may be made to appear on trial that the shot Shott shot shot Nott, or, as accidents with firearms are frequent, it may be possible that the shot Shott shot shot Shott, when the whole affair would resolve itself into its original elements, and Shott would be shot and Nott would be not. It seems to us more probable, however, that the shot Shott shot shot not Shott but Nott. To tell the truth, blamed if we know who was shot and who was not.

The big oil fire at Beaumont, Texas, after burning fiercely for twelve days, finally subsided by the gusher becoming choked. Then the fire went out.

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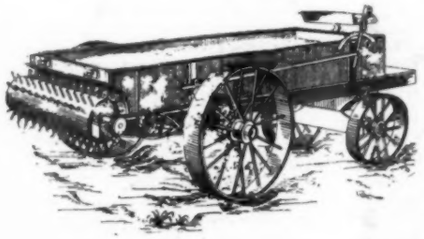
This new machine consists of a drum with teeth placed outside the tail-board of a wagon, and made to revolve by means



of a link belt driven from the hub of one of the rear wheels. A more even distribution of the fertilizer is thus secured.

KLONDIKE GOLD GETTING SCARCE.

The production of gold in the Klondike the coming year, according to government estimates, will not exceed $14,000,000. The yield last year was $24,000,000. No new discoveries have been made for over a year, although prospectors have been scouring the country since 1897. At Dawson there are said to be ten applicants for every job, yet boat load after boat load of men continue to arrive, the transportation companies keeping up the illusion abroad that Dawson is the needy man's paradise.

SPELLING WORDS ON GRASS LAWNS.

A very simple device in underground irrigation which occasioned a great deal of curiosity, is described in the Irrigation Age. Pieces of 1-inch pipe were cut and bent to form the letters

H O M E

The pipes were perforated with small holes, each letter connected to the supply pipe and the whole buried 18 inches. Grass seed was then sowed on the lawn. The pipe was kept full of water at low pressure most of the time. No matter how bright the lawn, the words stood out plainly in a brighter green. A monogram or initials or full name can easily be made in the same way, and to those who are not in the secret the result is very perplexing.

WORLD'S FIVE GREATEST WARSHIPS.

The newly designed United States warships, the Louisiana and the Connecticut, with the British ships, the Edward VII, the Commonwealth and the Dominion, comprise the five largest warships in the world. The Connecticut and Louisiana will each carry four 12-inch, eight 8-inch, twelve 7-inch and twenty 3-inch guns. The Edward VII also carries four 12-inch, but instead of the eight 8-inch she is armed with four 9.2-inch guns. This, of course, is a much more powerful weapon than the eight 8-inch gun, but the rapidity of fire from the eight 8-inch will be so much greater that there will be far more likelihood of getting in an effective blow.

NO TIN PRODUCED IN AMERICA.

The American tin mines, which were said to portend such splendid returns a dozen years ago, have quietly sunk into oblivion. In 1893, according to the reports of the geological survey, this country produced 162,000 pounds of tin, valued at $32,400. In 1898 the output was 8,938 pounds. Since then the report of the geological survey has read, "Tin, none." In 1890 it was declared that the Black Hills were full of tin, and capitalists of Europe and America invested $20,000,000 in the enterprise. About $3,000,000 was put into machinery, which was set up in mills at Harney. Some of the money was spent for advertising. What became of the rest of it, probably the promoters can best explain. The tin in the Black Hills is too shallow to be profitably worked. The machinery that was set up has gone to rust and the mining stock is waste paper.

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